Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] 1. An offset detector for automatic frequency control in a 3GPP wireless communications network, the offset detector comprising:
a filter whose amplitude responses are DC-offsetted, odd functions, the filter having an input for receiving a complex gain signal and an output;
a delay block comprising an input for receiving the complex gain signal and an output;
a first adder electrically connected to the output of the filter and the output of the delay block, the first adder outputting the sum of the output of the filter and the output of the delay block;
a second adder electrically connected to the output of the filter and the output of the delay block, the second adder outputting the difference between the output of the filter and the output of the delay block; and
a third adder electrically connected to the output of the first adder and to the output of the second adder, the third adder outputting the difference between the output of the first adder and the output of the second adder.

[c2] 2. The offset detector of claim 1 wherein the output of

the offset detector is equal to the difference in magnitudes between the output of the first adder and the output of the second adder.

[c3] 3. The offset detector of claim 1 wherein the filter is a saw, sine, triangle, or rectangle filter.

[c4] 4. The offset detector of claim 1 wherein the filter is a finite impulse response filter.

[c5] 5. The offset detector of claim 4 wherein the filter performs a Hilbert transformation of the inputted complex gain signal.

[c6] 6. The offset detector of claim 5 wherein the number of taps of the Hilbert transformation is odd.

[c7] 7. The offset detector of claim 5 wherein the number of taps of the Hilbert transformation is five.

[c8] 8. An offset detector utilized in automatic frequency control in a 3GPP wireless communications system, the offset detector comprising:
a finite impulse response filter capable of performing a Hilbert transformation on an inputted complex gain signal;
a delay block, an input of the delay block connected to the complex gain signal;

a first adder connected to an output of the finite impulse response filter and to an output of the delay block, the first adder summing the output of the finite impulse response filter and the output of the delay block and outputting a first complex signal;
a second adder connected to the output of the finite impulse response filter and to the output of the delay block, the second adder subtracting the output of the delay block from the output of the finite impulse response filter and outputting a second complex signal; and
a third adder connected to the output of the first adder and to the output of the second adder, the third adder outputting a signal equal to the difference between the magnitudes of the first complex signal and the second complex signal.

[c9] 9. The offset detector of claim 8 wherein the number of taps in the finite impulse response filter is odd.

[c10] 10. A method of detecting the frequency offset in automatic frequency control in a 3GPP wireless communications network, the method comprising:
utilizing a DC-offsetted odd functioned filter to transform an inputted complex gain signal;
generating two complex signals representing positive and negative frequency components utilizing the output

of the DC-offsetted odd functioned filter and an output of a delay block; and

generating a output signal equal to the difference between the magnitudes of the two complex signals.

[c11] 11. The method of claim 10 wherein the DC-offsetted odd functioned filter is a saw filter, a sine filter, a triangle filter, or a rectangle filter.

[c12] 12. The method of claim 10 wherein the DC-offsetted odd functioned filter is a finite impulse response filter.

[c13] 13. The method of claim 12 wherein the finite impulse response filter comprises 5 taps.

[c14] 14. The method of claim 12 wherein the transformation performed by the finite impulse response filter is a Hilbert transformation.